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Fast pyrolysis of biomass is a well-known technology for producing bio-oil, however in order to use the oil as transportation fuel the oxygen content must be decreased from approximately 30 wt.% to below 1 wt.%. This can be achieved by catalytic hydrodeoxygenation (HDO). Unfortunately, deactivation due to coking of the catalyst is an inhibitive problem for this technology. The objective of the present work is to produce oxygen free gasoline and diesel from biomass by hydrogen assisted catalytic fast pyrolysis. Fast pyrolysis of beech wood has been performed in high-pressure hydrogen atmosphere in a fluid bed reactor with a commercial $CoMoS/MgAl_2O_4$ catalyst as bed medium followed by an additional vapor phase, fixed bed HDO reactor using a commercial $NiMoS/Al_2O_3$ catalyst .The obtained bio-oil is essentially oxygen free. Oxygen specific GC-AED showed only traces of phenols, benzofurans and napthols (< few ppm) as the remaining oxygenates. The temperature in the fluid bed reactor has been varied between 365 and 470 ^oC and pressure has been varied between 15 and 35 barg in order to investigate the impact on yields and oil composition. The char yield decreased with increasing temperature and decreasing pressure. Increasing the pressure also increased the water yield and decreased the CO/CO_2 yield, indicating that the reaction pathway for the oxygen removal is highly pressure dependent. GCxGC-FID analysis of the condensed oil product showed a chromatic area up to 79 % for aromatics, indicating that the aromatic content in the oil is equilibrium controlled. Elemental analysis showed that the oxygen content in the char decreased with increasing temperature in the fluid bed reactor. Oil yields of up to 21.6 wt.% were obtained, corresponding to an energy recovery of 51 %. An experiment without the HDO reactor showed that most oxygen is removed in the fluid bed reactor.